PB83-142612

Publication Rotogravure Printing Background Information for Promulgated Standards

(U.S.) Environmental Protection Agency
Research Triangle Park, NC

Oct 82

U.S. Department of Commerce
National Technical Information Service
NTIS

PB83-142612

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-450/3-80-031b
October 1982

Air

EPA

Publication Rotogravure Printing - Background Information for Promulgated Standards

Final EIS

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TECHNICAL REPORT DATA
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1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-450/3-80-031b		PB83 142612

4. TITLE AND SUBTITLE	5. REPORT DATE
Publication Rotogravure Printing - Background Information for Promulgated Standards	October 1982
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, North Carolina 27711	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO. 68-02-3058
12. SPONSORING AGENCY NAME AND ADDRESS DAA for Air Quality Planning and Standards Office of Air, Noise, and Radiation U.S. Environmental Protection Agency Research Triangle Park, North Carolina 27711	13. TYPE OF REPORT AND PERIOD COVERED Final
	14. SPONSORING AGENCY CODE EPA/200/04

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Standards of Performance for the control of VOC emissions from publication rotogravure printing presses are being promulgated under the authority of Section 111 of the Clean Air Act. These standards would apply only to presses printing saleable products and for which construction or modification began on or after the date of proposal of the regulation. This document contains a summary of public comments, EPA responses, and a discussion of differences between the proposed and promulgated standards of performance.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Graphic Arts Industry Pollution Control Publication Rotogravure Printing Rotogravure Standards of Performance Volatile Organic Compounds (VOC)	Air Pollution Control	13B

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Unlimited	Unclassified	46
	20. SECURITY CLASS *(This page)*	22. PRICE
	Unclassified	

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

EPA-450/3-80-031b

Publication Rotogravure Printing - Background Information for Promulgated Standards

Emission Standards and Engineering Division

U.S ENVIRONMENTAL PROTECTION AGENCY
Office of Air, Noise, and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

October 1982

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PUBLICATION NO. EPA-450/3-80-031b

ENVIRONMENTAL PROTECTION AGENCY

Background Information
Final Environmental Impact Statement
for Publication Rotogravure Printing

Prepared by:

Don R. Goodwin 10/21/82

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Director, Emission Standards and Engineering Division
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1. The promulgated standards of performance will limit emissions of volatile organic compounds (VOC) from new, modified, and reconstructed publication rotogravure printing presses. Section 111 of the Clean Air Act (42 U.S.C. 7411), as amended, directs the Administrator to establish standards of performance for any category of new stationary source of air pollution that ". . . causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare." The Midwest and East Coast Regions of the United States are particularly affected.

2. Copies of this document have been sent to the following Federal Departments: Office of Management and Budget; Labor, Health and Human Services, Defense, Transportation, Agriculture, Commerce, Interior, and Energy; the National Science Foundation; the Council on Environmental Quality; members of the State and Territorial Air Pollution Program Administrators; the Association of Local Air Pollution Control Officials; EPA Regional Administrators; and other interested parties.

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1. SUMMARY

On October 28, 1980, the Environmental Protection Agency (EPA) proposed standards of performance for the Graphic Arts Industry; Publication Rotogravure Printing (45 FR 71538) under authority of Section 111 of the Clean Air Act. Also, a draft Environmental Impact Statement (EIS) was published in a background document (BID) entitled, Publication Rotogravure Printing - Background Information for Proposed Standards (EPA 450/3-80-031a). Public comments were requested on the proposal in the Federal Register. There were six commenters representing the printing industry. Comments were also received from the State of Wisconsin and the National Instutute for Occupational Safety and Health. In addition to written comments, a public hearing was held on November 25, 1980.

This BID supports promulgation of the Federal standard for limiting volatile organic compound (VOC) vapor emissions from the printing presses. This document provides a final EIS and a discussion of changes made after proposal resulting from public comments. Chapter 1 presents a summary of the changes made to the regulation between proposal and promulgation, with resulting impacts, and any corrections or clarifications to the draft EIS. Chapter 2 contains a summary of all comments and EPA responses to the comments.

1.1 SUMMARY OF CHANGES SINCE PROPOSAL

The proposed regulation was extensively revised for promulgation. The significant changes involved the format of the standard, determination of compliance, monitoring of operations, recordkeeping, and reporting. Wording revisions were also made in several miscellaneous items.

1.1.1 Format of Standard

The emission limit for the revised VOC standard was changed from a volume to a mass basis. Public comments pointed out that most ink suppliers base their raw ink formulation and VOC content on weight measurements. Also, raw ink is usually sold by weight rather than volume. Several plants presently prefer ink tank truck weighings and ink storage tank weighings to volume meters for monitoring raw ink

usage. In addition, the mass-based emission limit eliminates the necessity for calculation of the solvent base temperature that was required with the proposed volume-based emission limit (see Section 1.1.2).

The proposed separate VOC emission limits for waterborne and solvent-borne ink usage have been combined into one standard in the final regulation. The proposed VOC-to-solids volume ratio and solvent dilution limits for waterborne ink systems were deleted. The emission limit for the revised standard is based on the total amount of VOC solvent and water used at the press.

The revision allows the industry greater flexibility for the use of waterborne ink systems for several reasons. First, there are no restrictions on the VOC-to-solids ratio. Second, the revised standard creates an incentive for development of very low VOC waterborne inks. Where solvent-borne and very low VOC waterborne inks are used at separate printing units on the same press, compliance could be accomplished with less stringent control of VOC vapors from the solvent-borne inks. On the other hand, the revised standard allows use of higher VOC waterborne inks provided that the VOC control level on solvent-borne inks would be correspondingly increased to comply with the emission limit for the entire press. Finally, the revised standard allows the addition of VOC to the raw inks used at the press.

1.1.2 Determination of Compliance

The final regulation requires only an initial performance test with other tests as requested by the Administrator instead of continual monthly performance tests as required in the proposed regulation. The proposed performance test procedures and compliance provisions sections were combined in the final regulation. The proposed direct solvent volume balance equations for calculating emission percentages were revised to mass balance equations. Mass balance equations for determination of compliance with waterborne ink systems have been added. The proposed separate performance test procedures and compliance provisions for waterborne ink usage were deleted. Performance tests will require volume or mass measurements, as well as temperature measurements for

density determination of the ink, solvent, and water used and solvent recovered from the presses. However, the measurement recording requirements have been reduced from daily to at least weekly. With the mass balance format, calculation of a solvent base temperature is not needed. Thus, all proposed temperature symbols (B_c, B_d, B_g, and B_e) and the proposed base temperature calculation equation were deleted. However, the mass balance equations required addition of new symbols for the following terms in the final regulation:

- The mass of VOC solvent and water quantities measured by direct weighing (M_c, M_d, M_g, M_h, M_m, M_o, M_r, M_t, M_v,and M_w),
- The volume of water used measured by liquid meters (L_h),
- The weight fraction of VOC in the raw ink and related coatings used (W_o),
- The volume and weight fraction of water in the raw inks and related coatings used (V_w and W_w),
- The densities of measured liquid volumes used and recovered (D_c, D_d, D_g, D_h, D_m, D_o, and D_w), and
- The VOC solvent density at a base temperature (D_b).

Two optional compliance provisions were added in the final regulation. The first option allows for compliance determination by a density-corrected solvent volume balance instead of a mass balance if only solvent-borne inks are used. This option might be desireable if only liquid volume flow meters are used for monitoring ink, solvent, and water handled (see monitoring in Section 1.1.3). The second option allows the owner or operator to choose to demonstrate compliance by showing that the total VOC discharged from all affected and existing facilities in the plant is equal to or less than 16 percent of the total mass of VOC solvent and water used at those facilities during the performance test. This option gives industry the flexibility requested in the comments by removing the requirement that the owner or operator measure raw ink usage at each affected facility. By choosing this option, the owner or operator would not need to segregate ink usage at each affected facility from ink usage at existing and other affected facilities. Also,

no separate emission tests on existing facilities would be necessary with this option.

Because this second option permits a showing of plantwide compliance, an owner or operator choosing this option would be required to show that the average control among all plant facilities -- affected and existing -- is equal to or better than the NSPS level of control. In the Agency's judgment, under the circumstances presented here this assures that the affected facilities within the plants will achieve the degree of control reflecting application of the best demonstrated system of continuous emission reduction. As a result, the plantwide compliance option will provide rotogravure plant owners the benefit of measurement flexibility without any resulting loss in emission reduction.

After careful consideration of the public comments, the Administrator concluded that the compliance provisions could be made more flexible without sacrificing environmental benefits of the standard. The regulation was changed to allow alternatives to ink and solvent metering because the high cost of ink and solvent creates sufficient economic incentive for this industry to keep very accurate ink and solvent usage records. Also, the economic incentive to recover solvent and the possibility of the Administrator requiring a performance test are sufficient to ensure that the industry will operate the best demonstrated control system effectively.

1.1.3 Monitoring and Recordkeeping

The final regulation gives the industry much greater monitoring flexibility than allowed in the proposed regulation. The proposed stipulations requiring ink and solvent volume meters, automatic temperature compensators on recovered solvent meters, and temperature indicators have been deleted. The proposed meter recalibration requirements were also deleted. All of these items are still allowed, however, if an owner or operator chooses to use them. Alternative liquid measuring techniques to press meters are allowed, but are not specified in the final regulation. In addition, the equation for calculation of solvent base temperature has been deleted since emission percentage is determined

by a mass balance in the final regulation. The proposed separate monitoring requirements for waterborne ink systems were deleted since the proposed separate waterborne and solvent-borne ink standards were combined into one standard in the final regulation.

After performance tests are completed, the final regulation requires simplified recordkeeping for monitoring proper operation and maintenance. Records of monthly solvent and water use, solvent recovery and the estimated monthly emission percentages must be maintained. Temperature readings of the measured inks and solvents are not required. The estimated emission percentages will be useful to plant personnel in troubleshooting decreases in solvent recovery efficiencies. The Administrator will also use this information to determine whether additional performance tests would be required because of improper operation or maintenance.

1.1.4 Reporting

The proposed requirement for non-compliance reports has been deleted in the final regulation. Reports of excess emission and all periodic reports were deleted because the Administrator has the authority to inspect plant records at any time and request additional performance tests. Deleting such reporting requirements reduces the burden on industry to prepare and submit reports. Also, EPA is relieved of having to review and file the periodic reports.

1.1.5 Miscellaneous Revisions

The proposed definition of affected facility has been reworded in the final regulation. The definition of "Publication rotogravure printing press" has been revised in accordance with the clarification notice published in the Federal Register (46 FR 8587) on January 27, 1981. Reference to Standard Industrial Classification (SIC) codes have been deleted. A list of the publication printing products was added to the definition. Also, the term "proof press" was added to the list of definitions and the proof press exemption has been clarified in a separate paragraph.

In addition several other definitions and notations were revised in the final standard. The following terms were clarified by wording changes: "Automatic temperature compensator", "Base temperature", "Density", "Gravure Cylinder", "Performance averaging period", "Publication rotogravure printing press", "Rotogravure printing unit", "Solvent-borne ink systems", "Solvent recovery system", "VOC", and "Waterborne ink systems." The proposed term, "Total amount of VOC solvent used" was deleted.

Several wording changes were made in the test methods and procedures section of the regulation. In addition, the title for the reference test method proposed with the regulation has been changed from 29 to 24A. Several typographical errors were also corrected in the text of the test method.

1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

1.2.1 Alternatives to Promulgated Action

The regulatory alternatives are discussed in Chapter 6 of the proposal BID. These regulatory alternatives reflect the different levels of emission control from which one is selected that represents the best demonstrated technology, considering costs, nonair quality health, and environmental and economic impacts for publication rotogravure printing. These alternatives remain the same.

1.2.2 Environmental Impacts of Promulgated Action

The changes in the regulation described above will have no effect on the environmental impacts ascribed to the standard as originally proposed. These impacts are described in Chapter 7 of the proposal BID. That analysis of environmental impacts now becomes the final Environmental Impact Statement (EIS) for the promulgated standards.

1.2.3 Energy and Economic Impacts of Promulgated Action

Section 7.4 of the proposal BID describes the energy impacts of the standards. The changes made in the standards have no effect on these impacts.

Chapter 8 of the proposal BID describes the economic impacts of the proposed standards. The replacement of specific metering requirements

with options for use of other ink and solvent measurement methods may slightly reduce some operating costs. This is primarily because of the elimination of meter recalibration requirements. The elimination of noncompliance reporting may also slightly reduce operating costs. However, the economic impacts of the promulgated standards are expected to remain essentially as presented in the proposal BID.

1.2.4 Other Considerations

1.2.4.1 Irreversible and Irretrievable Commitment of Resources. Chapter 7 of the proposal BID concludes that other than fuels required for steam and electricity generation and the materials required for construction of the system, there is no apparent irreversible or irretrievable commitment of resources associated with the construction or operation of the control systems. This remains unchanged since proposal.

1.2.4.2 Environmental and Energy Impacts of Delayed Standards. Table 1-1 in the proposal BID summarizes the environmental and energy impacts associated with delaying promulgation of the standard. Delayed promulgation would mean affected facilities would be controlled to the State Implementation Plan (SIP) level. This is the control level used as the baseline alternative in the model plant analyses. These impacts remain unchanged since proposal.

1.2.4.3 Urban and Community Impacts. Chapter 8 of the proposal BID discusses potential socioeconomic impacts. There have been no changes in the urban or community impacts since proposal of the standards.

1.2.4.4 Corrections and Clarifications. The proposal BID presented discussions stating that modifications and reconstructions would not occur in this industry (p. 8-15 and 8-49). However, after proposal of the standard, several industry representatives expected retrofitting of existing presses to become more common. See discussion in Chapter 2.

The term "Fugitive Solvent Vapors" was mistakenly left off of the right side of Figure 4-2, "Cabin enclosure . . . printing press" (p. 4-12) in the proposal BID.

2. SUMMARY OF PUBLIC COMMENTS

The list of commenters, their affiliation, and the EPA docket number of each of the comments are shown in Table 2-1. In addition to comments made at the public hearing, seven letters commenting on the proposed standard were received. The comments have been combined into the following nine categories:

2.1 General
2.2 Emission Control Technology
2.3 Modification and Reconstruction
2.4 Economic Impact
2.5 Environmental Impact
2.6 Emission Monitoring
2.7 Test Methods
2.8 Reporting and Recordkeeping
2.9 Miscellaneous

The comments and responses are discussed in the following sections of this chapter. A summary of changes made in the regulation is included in Chapter 1.

The docket reference is indicated in parentheses in each comment. Unless otherwise noted, all docket references are part of Docket Number A-79-50, Category IV. For comments made at the public hearing, the page number from the transcript (F-1) is shown.

2.1 GENERAL

2.1.1 Comment: General comments were made on several different topics. One commenter (D-1; F-1, p. 7) pointed out, both at the public hearing and in his subsequent letter, that the new source performance standards (NSPS) are not really necessary to obtain the projected 13 percent emission reduction because the gravure industry has already taken steps to control emissions. He cited as an example the fact that all the

TABLE 2-1

List of Commenters on the Proposed Standards of Performance for Publication Rotogravure Printing Presses.

Docket Number A-79-50, IV

Public Hearing

Commenter	Docket Reference
Mr. Harvey George GRI/GTA Gravure Industry Emission Control Committee 22 Manhasset Avenue, Manorhaven Port Washington, New York 11050	F-1
Mr. Gerald Bender R. R. Donnelley and Sons Company 2223 S. Martin Luther King Drive Chicago, Illinois 60616	F-1
Mr. W. B. Cashion R. J. R. Archer, Inc. Winston-Salem, North Carolina	F-1
Mr. Michael Lefkow R. R. Donnelley and Sons Company 2223 S. Martin Luther King Drive Chicago, Illinois 60616	F-1
Mr. R. D. Fremgen Dayton Press, Inc. Post Office Box 700 Dayton, Ohio 45407	F-1
Mr. Bob Oppenheimer Gravure Research Institute, Inc. 22 Hanhasset Avenue, Manorhaven Port Washington, New York 11050	F-1
Mr. Warren Weaver Diversified Printing Post Office Box D Atglen, Pennsylvania 19310	F-1

Letters

Commenter	Docket Reference
Mr. Harvey George GRI/GTA 22 Manhasset Avenue, Manorhaven Port Washington, New York 11050	D-1 D-1a D-7 (no comments)
Mr. Warren Weaver Diversified Printing Post Office Box D Atglen, Pennsylvania 19310	D-2
Mr. Thomas J. Dunn, Jr. Flexible Packaging Association 12025 Shaker Boulevard Cleveland, Ohio 44120	D-3
Mr. W. D. Major Westvaco 299 Park Avenue New York, New York 10017	D-4
Mr. J. F. McAvoy State of Ohio Environmental Protection Agency 361 E. Broad Street Columbus, Ohio 43216	D-5 (no comments)
Mr. Donald F. Theiler Wisconsin Department of Natural Resources Box 7921 Madison, Wisconsin 53707	D-6
Mr. Bailus Walker U. S. Department of Labor Occupational Safety and Health Administration Washington, D.C. 20210	H-1 (no comments)
Mr. L. R. Harris National Institute for Occupational Safety and Health 5600 Fishers Lane Rockville, Maryland 20857	H-2

plants tested or surveyed during the development of this regulation had installed solvent recovery systems without regulation. He said that future installations would do the same because of current State regulations and because it is now and will continue to be economically beneficial to do so.

Response: There are several reasons for EPA's establishing an NSPS for publication rotogravure printing. First, as stated in the preamble to the proposed regulation (45 FR 71540), publication rotogravure printing is part of the graphic arts industry which is sixth on the "Priority List and Additions to the List of Categories of Stationary Sources" promulgated at 44 FR 49222 on August 21, 1979. This list for new source performance standards ranks emission sources in terms of quantities of air pollutant emissions, mobility and competitive nature of each source category, and the extent to which each pollutant endangers public health and welfare. The Agency's listing of publication rotogravure printing is the result of the Administrator's finding that the publication rotogravure printing industry is a significant contributor to air pollution and the Agency is aware of no reasons to alter this finding. Section 111(b)(1)(B) of the Clean Air Act requires the Administrator to promulgate NSPS for all categories on the priority list.

Second, economic incentives may not be strong enough to ensure that rotogravure publication plants will use the best demonstrated technology. Section 111(a)(1)(B) of the Clean Air Act as amended August 1977, states that a standard of performance shall reflect the degree of emission limitation achievable through application of the best (emphasis added) technological system of continuous emission reduction. Although all plants tested or visited had solvent recovery systems, the best demonstrated technology was not being used at all plants tested. Furthermore, only 19 out of the 27 publication rotogravure plants existing when the standards were proposed had solvent recovery systems.

2.1.2 Comment: A question was raised by two participants at the public hearing (F-1, p. 13-15, 17) concerning the definition of VOC. The commenters asked if the EPA proposed to publish a method whereby one could determine whether or not an organic compound participates in atmospheric photochemical reactions. They stressed that the EPA needed to clarify the VOC definition.

This question was in regard to the proposed definition of VOC distributed at the public hearing as an attachment to the agenda. That definition states, "'Volatile Organic Compound' means any organic compound which participates in atmospheric photochemical reactions, or which is measured by a reference method, an equivalent method, an alternative method, or which is determined by procedures specified under any subpart."

Response: This definition has since been promulgated at 45 FR 85415 on December 24, 1980 and was amended to 40 CFR 60.2 in July 1981.

EPA published its initial policy on photochemical oxidants entitled "Recommended Policy on Control of Volatile Organic Compounds," on July 8, 1977 (42 FR 35314). The policy was later clarified on June 4, 1979 (44 FR 32042), on May 16, 1980 (45 FR 32424), and again on July 22, 1980 (45 FR 48941). The policy excludes 11 organic compounds from the family of organics that react to form oxidants. Additional work is underway and it is possible that other organics may be added to the list of compounds that do not react. A method for determining if a compound is photochemically reactive is not part of the definition of VOC. However, EPA does determine photochemical reactivity of organic compounds and lists those considered to be of negligible reactivity.

2.1.3 Comment: At the public hearing and in a letter (D-1; F-1, p. 8), a representative of the Gravure Research Institute and the Gravure Technical Association said that the gravure industry considered the 84 percent standard for emission control to be a realistic figure. The industry felt it would be hard to meet on an annual basis, but they were optimistic that the industry would be able to comply.

Response: As discussed in the section entitled "Selection of Numerical Emission Limits" in the preamble to the proposed regulation (45 FR 71546), the emission limit of 16 percent, or 84 percent overall reduction, was chosen to allow for variations in control efficiency over an entire year of operation. The data base showed that a 15 percent emission limit could be achieved for most of the monthly compliance periods during the year. However, there were a few months in which the emission limit was slightly exceeded. The standard was, therefore, relaxed to 16 percent. The Administrator believes this emission limit to represent the maximum control level achievable on a continual basis by the best demonstrated system of emission reduction.

2.1.4 Comment: The Flexible Packaging Association (D-3) objects to the implied applicability of the proposed standards to packaging rotogravure printing.

Response: The proposed standards do not apply to packaging rotogravure printing. The definition of affected facility was clarified in 46 FR 8587 on January 27, 1981. This clarification notice listed products covered by the standard.

2.2 EMISSION CONTROL TECHNOLOGY

2.2.1 Comment: One commenter (D-4) suggested that capture efficiency, especially with retrofit presses, may not be as high as contemplated by the proposed regulations. He noted that a recent publication (Gravure Environmental Newsletter, No. 11, page 23, Gravure Research Institute, Inc.) presents the results of capture efficiency tests made on a retrofit multi-color gravure press. Six determinations were made, using three different techniques. The average reported capture efficiency was 42 percent, with a range of 25-65 percent.

Response: EPA obtained a copy of the referenced publication (D-7) through a telephone call (E-12) to the Gravure Research Institute.

The referenced publication described capture efficiency tests conducted at rotogravure presses printing on paperboard to be used for the manufacture of folding cartons. Although these presses would not be subject to the standard for publication rotogravure presses, the printing equipment and capture systems are similar. The article concluded that the analytical methodology which had been used to determine capture efficiency was inaccurate. It acknowledged that if capture efficiencies were indeed as low as the test had measured, high solvent losses into the pressroom would have led to disastrous consequences because of the explosion hazard that would have been created.

During the development of this standard however, other more accurate and rigorous test methods were used to measure the overall recovery efficiency (capture and control device efficiencies combined) and the efficiency of the control device. Based on these measurements, EPA concluded and still maintains that the capture efficiency of a well designed press is in excess of 88 percent. The results of the tests conducted by EPA are summarized in Appendix C of the proposal BID (Volume I).

Furthermore, EPA finds no reason, and the commenter identified no reasons, for a retrofitted press to have a lower capture efficiency than a new press. The fugitive capture system required for a new press or a retrofit press could consist of similarly designed add-on devices having the same capture efficiencies.

2.3 MODIFICATION AND RECONSTRUCTION

2.3.1 Comment: One commenter (D-4) pointed out that the statement in the preamble to the proposed regulation (45 FR 71543 and 71550) that says, "neither modification nor reconstruction is expected in this industry," was not adequately supported. Subsequently, in a meeting on February 19, 1981, with the Gravure Technical Association, industry representatives stated that while they did not consider it a major issue, they believe reconstruction and modification are likely to occur in this industry.

The comment letter (D-4) suggested that neither modified nor reconstructed presses should be subjected to emission limits as stringent as totally new facilities. With the high cost of capital, an owner might very well choose to improve an old press by modification rather than install a completely new press. The latter would require either new floor space (more capital) or demolition of the existing press and temporary loss of its productive capacity. However, applying the new source limits to such a press would result in control costs equal to or greater than those for a new press due to retrofit costs. Thus, according to this comment, the cost of compliance would be proportionally much higher for a modified press. The commenter suggested that it would be reasonable for a modified or reconstructed press to be required to capture and control dryer exhaust vapors only. If the press dryers capture 85 percent of the total VOC used and the adsorber efficiency is 95 percent, as stated in the preamble to the proposed standards (45 FR 71542), then control of dryer exhausts only should achieve an overall control efficiency of 81 percent. He maintains that this is a reasonable control requirement for a modified or reconstructed press.

In two telephone calls to clarify this commenter's remarks (E-13 and 14), the respondent said that, although he has no definite information, he was referring to a hypothetical small printer who might want to upgrade an old press rather than purchase a new press. The commenter was concerned about the economic impact of having to install fugitive capture systems to comply with the proposed standards. He felt that just the rebuilding costs to upgrade capture efficiencies of old, inefficient dryers to 85 percent might present an excessively high economic impact on the small printer. The commenter mentioned several small printing operations that, to his knowledge, operated only one or two publication rotogravure presses. His concern was that these small printers might not be able to afford new presses and might be limited to retrofitting their existing presses.

Response: During the development of this regulation prior to proposal, EPA believed it was unlikely that existing facilities would become affected facilities under the provisions for modification and reconstruction (40 CFR 60.14 and 60.15). As discussed on page 8-15 of the proposal BID (Volume I), this belief was based on information from a representative of the Gravure Technical Association (II-E-19) who said that new presses are demanded because of technological improvements. Publication rotogravure printing is a very competitive industry. Rapidly improving press operation technology makes new printing presses and associated equipment significantly more desirable to maintain or improve a printer's competitive position.

The comment summarized above indicated that this belief may have been incorrect and that there may be instances in which an existing facility would be upgraded. Such a source would become subject to the NSPS if it were modified or reconstructed. An existing source becomes a modified source if a physical or operational change involving a capital expenditure results in an increase in the emission rate of a pollutant to which the standard applies (40 CFR 60.14). An existing source is considered on a case-by-case basis to be reconstructed if the fixed capital cost of new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new facility and if it is technologically and economically feasible to meet the standard (40 CFR 60.15).

In view of the possibility that some existing presses will be retrofitted and may be affected by the standard, EPA sought to obtain information to determine and evaluate possible added impacts the standard might have on such sources. Specifically, EPA attempted to conduct cost and economic analyses on expansion of existing carbon adsorption controls for retrofit model plant cases. EPA requested control cost information on retrofitted facilities from the industry at the February 19, 1981 meeting (E-19) and made several additional requests for data from the industry (E-20, E-21, E-22, E-24). No information was received, however. In addition, EPA consulted a major carbon adsorber manufacturer (E-23)

for guidance and expertise in analyzing expansion costs of the control systems. Information received indicates that control system capital costs for retrofitted facilities are generally higher than for same size new installations. This information does not suggest, however, that these costs would be unreasonable. Moreover, the Agency found no specific process characteristics that would render control of retrofitted facilities technologically infeasible or exorbitantly costly; nor did any commenter provide such information. It should also be noted that an older facility would need only to improve the performance of its current control system to prevent an increase in emissions, and thereby prevent a modification. This improvement would often not be as costly as an improvement necessary to meet the NSPS.

Consequently, EPA must conclude that the effect of the standard on modified and reconstructed facilities is not significantly different from new facilities and that possible impacts would be reasonable. Since the provisions of 40 CFR 60.15 provide for case-by-case determinations of technical and economic feasibility, reconstructed sources are precluded from unreasonable impact. In the case of an older source which modernizes and increases emissions (i.e., a modification), without any specific examples of the circumstances under which unreasonable impact would result from compliance with the standard, EPA finds no basis at this time for establishing a separate standard or an exemption.

2.3.2 Comment: The commenter (D-4) also noted that installation of an additional printing station, or "unit", would not necessarily result in increased emissions, as stated on page 45 FR 71550. He stated that it is possible that the press would be designed for a new product having less total ink coverage and thus fewer VOC emissions. The addition

of printing units should not be considered prima facie evidence of increased emissions.

Response: The preamble to the proposed regulation may have been misleading on this point. It states that each unit is potentially an equal source of emissions and therefore, the addition of units would (emphasis added) cause an incremental increase in emissions. This statement would have been clearer if it had said that additional units could increase emissions. EPA agrees that addition of printing units would not necessarily increase emissions.

2.4 ECONOMIC IMPACT

2.4.1 Comment: One commenter (D-4) stated that spent carbon from the adsorber might be considered hazardous solid waste under the provisions of the Resource Conservation and Recovery Act (RCRA). The commenter stated that proper handling and disposal of such waste would affect the economic impact of the standard. This possibility is not considered in the solid waste section on page 45 FR 71544 of the preamble to the proposed regulation.

Response: In the analysis of carbon adsorption systems undertaken by EPA prior to the development of these standards of performance for publication rotogravure printing, it was assumed that facilities would use the existing, routine option of returning the waste carbon to the activated carbon supplier and that the supplier would be equipped to handle the waste in an acceptable fashion.

Activated carbon waste is not presently listed as a hazardous waste (40 CFR Part 261.30) although some rotogravure printing solvents which would be adsorbed on the carbon particles are listed. This list is periodically revised and activated carbon conceivably could be included at some later date. If spent carbon should be listed as a hazardous waste in the future, the option of returning the carbon to the supplier would still be a viable one and would not be precluded under RCRA provisions.

2.5 ENVIRONMENTAL IMPACT

2.5.1 Comment: One of the letters received (D-4) pointed out that the potential emission reduction for a "typical sized new plant" (45 FR 71539) using the proposed standards versus baseline is not 700 megagrams per year but (6400)(0.25-0.16) = 576 megagrams per year.

Response: The calculation in this comment is correct if only 84 percent control is assumed. However, the discrepancy noted is the result of two factors. First, as noted in the preamble (45 FR 71539), "the projected impacts are based on the expectation that, most of the time, only 15 percent (85 percent overall control) of the total VOC solvent used at affected facilities would be emitted. However, emissions are expected to increase to the 16 percent level (84 percent overall control) during only one or two months per year." Projected impacts were calculated assuming 15 percent control level. Therefore, the estimate of potential reduction described in the preamble was calculated as (6400)(0.25-0.15) = 640 megagrams per year. The figure of 640 was rounded to "about 700" rather than 600.

Second, Table 6-1 in the BID, Volume I illustrates another calculation of potential reduction. It lists expected emissions with controls. At the 75 percent and 85 percent control levels, expected emissions are 1596 Mg/yr and 946 Mg/yr, respectively. Calculating potential reduction from these figures, 1596-946 = 650 Mg/yr or about 700 Mg/yr.

2.6 EMISSION MONITORING

2.6.1 Comment: Several commenters (D-1; D-4; F-1, p. 10-11, 21-24) mentioned that the proposed regulation was too detailed, complex, and inflexible. One of the major points was that the industry recognizes the need for accurate ink and solvent consumption measurements, but suggests that acceptable alternative compliance provisions be included with the metering devices required in the proposed regulation. Of the plants tested for the development of this regulation, one commenter thought only one used the ink metering system described in the standard.

This commenter noted that most of EPA's background data was based on plant records of ink shipments combined with tank level meters rather than by numerous flow meters. Commenters felt that these flow meters are expensive to buy and calibrate, inconvenient to service, and too numerous to read daily. A plant containing four eight-unit presses would need as many as 96 ink and solvent meters. Most plants rely on other types of records. Printers have found that ink manufacturers' delivery records of their tank truck loading meters, ink tank truck weighings, tank truck unloading meters, storage tank level measurements, or storage tank weighings with a strain gauge are more accurate and more easily serviced than meters installed at the press. Commenters noted that local pollution agencies tend to apply only the methods specified in Federal regulations. Therefore, any alternative compliance provisions included in the proposed standards would minimize problems with local pollution agencies.

Response: The Agency has made four major changes that simplify and add flexibility to the standard. First, the final standard permits the owner or operator to show compliance on a plantwide basis. Second, the final standard contains no specific procedures for measuring the amount of ink and solvent used at the press. Third, facilities are no longer subject to continual or monthly compliance tests. Finally, there are no longer any periodic monthly reporting requirements. The first three changes are discussed in this response; changes in reporting requirements are discussed in Section 2.8.

In response to the commenters' request for alternative compliance provisions, the Agency has added to the final standard a provision allowing the owner or operator to demonstrate compliance by showing that the total VOC discharged from all affected and existing facilities in the plant is equal to or less than 16 percent of the total mass of VOC solvent and water used at those facilities during the performance test. This option gives industry the flexibility requested in the comments by removing the requirement that the owner or operator measure raw ink

usage at each affected facility. By choosing this option, the owner or operator would not need to segregate ink usage at each affected facility from ink usage at existing and other affected facilities.

Because this option permits a showing of plantwide compliance, an owner or operator choosing this option would be required to show that the average control among all plant facilities -- affected and existing -- is equal to or better than the NSPS level of control. In the Agency's judgment, under the circumstances presented here this assures that the affected facilities within the plants will achieve the degree of control reflecting application of the best demonstrated system of continuous emission reduction. As a result, the plantwide compliance option will provide rotogravure plant owners the benefit of measurement flexibility without any resulting loss in emission reduction.

Whether the owner selects this compliance option or instead chooses to show compliance at each affected facility, the owner is no longer limited to a specific procedure for measuring ink and solvent consumption in calculating the material balance. EPA studied the alternative compliance provisions recommended in this comment and for several reasons concluded that there are suitable alternatives to the ink and solvent metering system required in the proposed regulation. First, because of high ink costs and the large amounts of ink used, this industry and the ink suppliers have a strong economic incentive to keep accurate records of raw ink usage. For example, a typical four-press printing plant uses about 4,500 tons of raw ink per year. At the 1981 price range of $0.50 to $1.00 per pound, the annual raw ink costs amount to:

$$4{,}500 \text{ tons} \times 2{,}000 \frac{\text{lbs}}{\text{ton}} \times (\$0.50 \text{ to } \$1.00 \text{ per lb}) = \underline{\$4.5 \text{ to } \$9.0 \text{ million}}$$

A ±1.5 percent error, comparable to the proposed regulation accuracy requirements for press ink meters, would result in an accounting error for annual operating costs of $68,000 to $135,000. Thus, even a small error would be very costly to a plant. Second, there is doubt as to the accuracy of press ink meters. According to printing industry representatives

(E-19), press ink meters are not accurate to ±1.5 percent, the level required in the proposed regulation. However, a meter manufacturer (E-8) claims meters are accurate to the level required or the proposed standard. EPA agrees with the printing industry that maintenance of accuracy could be a problem. Finally, printing industry representatives (E-19) have explained that alternative ink measurement techniques can give accurate and timely measurement of ink used at the affected facility.

To provide more flexibility, several ink and solvent monitoring options have been added to the final regulation. The industry is allowed to use any monitoring devices and procedures which will provide an accurate accounting of ink and solvent consumption. Procedures for various monitoring alternatives have not been delineated in the regulation. Such specification of alternative procedures would have greatly increased the complexity of the regulation. Measurement of the mass or corrected-volume of ink, solvent, and water used and solvent recovered is required in the final regulation for performance tests and for monthly monitoring purposes.

The main alternatives to press ink metering devices are ink storage tank weighings or level measurements, ink tank truck weighings, truck loading and unloading meters, and ink supplier shipment records. Where individual press metering devices are not used for affected facilities, temporary separate ink and solvent storage/handling systems must be used during performance tests to segregate affected and existing facilities. However, this requirement is not necessary if the combined facilities or plantwide compliance options are chosen. Where ink storage tank weighings or level measurements are used, the tank inventory must be recorded both immediately before and after each new ink supply addition.

If ink tank truck weights or loading or unloading meters are used, the weight or meter readings must be recorded for each delivery and the quantities of each color of ink in the shipment must be recorded separately. Reliable procedures must be followed in using any alternative to minimize the potential ink accounting error resulting from the lag time between ink inventory and actual use at the press.

It is important to note that the ink metering system required by the proposed regulation was chosen for three reasons. First, EPA believed that there are modern flow meters available which could be very accurate for this service. Both plants tested during the development of this regulation, Meredith/Burda, Inc. and Texas Color Printing, Inc., used the ink and solvent metering system described in the proposed standards. The accuracy requirements in the proposed regulation were based on the meter manufacturer's specifications for the meters used at both these plants. EPA still believes that if the press ink meters are calibrated prior to a performance test, they are sufficiently accurate for compliance purposes.

The second reason for EPA's choice of meters is that each individual new press, not the entire printing plant, has been designated as the affected facility. In addition to new publication presses, some printing plants might contain older (existing) publication presses, gravure presses for printing only packaging or specialty gravure products, and other printing type presses. Thus, in multiple-press plants, the press ink metering system provides a convenient method to account for raw inks used directly at the affected presses.

The third reason for selecting the ink metering system in the proposed regulation was that ink press meters provide for timely accounting of the raw inks on an "as used at the press" basis. This procedure minimizes any lag-time error from inventory accumulations, which could occur where using ink supplier shipment records, tank truck weighings, or truck unloading meters. However, this would not be a problem for storage tank monitoring, which reflects a direct response to ink usage at the press. For these three reasons, ink meters are still considered suitable for determining compliance.

The third major change in the final regulation deleted the proposed continual monthly compliance test requirement. Compliance with the

emission limit must be demonstrated during an initial performance test and any other test requested by the Administrator. After completion of the performance test, monthly monitoring is conducted to determine if the control system is being properly operated and maintained. The economic incentive to recover solvent and the possibility of the Administrator's requiring a performance test are sufficient to ensure that the industry will operate the best demonstrated control system effectively.

2.6.2 Comment: The gravure industry (D-1; F-1, p. 10) questioned the necessity for measurement of the temperature of the inks used.

Response: In the final regulation, the material balance may be calculated either on a mass basis or on a temperature/density corrected volume basis. In most cases, some quantity required for the material balance will be measured by volume and will require a figure for ink density to convert to a mass basis or will require temperature measurement to calculate volume at a constant temperature. Since density of a liquid varies with temperature, it is necessary to measure temperature to determine density. For the toluene and naphtha solvents used in this industry, the potential error in determination of compliance would be about 2.0 to 3.5 percent or more (see response to comment 2.6.8).

The final regulation requires temperature measurement only during a performance test. After ink and solvent densities are determined in the performance test, those densities are used in monthly calculations to estimate the corrected amounts of ink and solvent used and recovered.

2.6.3 Comment: Two commenters (F-1, p. 10, 27, 28) felt that daily temperature measurements and daily ink meter readings are unnecessary and would require a great deal of time because of the large number of meters in each plant. It would be at the owner's risk of non-compliance if he chose not to monitor these parameters daily. However, to make it mandatory is quite an administrative burden on the industry.

Response: The regulation has been revised to relax the daily monitoring requirements to an at least weekly basis during performance tests. After completion of performance tests, only monthly accounting of ink, solvent, and water usage will be required. Monthly temperature measurements will not be required.

2.6.4 Comment: At the public hearing, an industry representative (F-1, p. 10-12) explained that a typical ink distribution system involves a circulating loop of ink that feeds to the various press units. A measurement of the ink temperature at any point in this loop would be the same, making it redundant to have a temperature indication at each ink meter.

Response: Temperature indicators of ink at the press are not required in the final regulation. However, EPA agrees that only one temperature indicator would be necessary in an ink circulation loop where ink flows through several press unit meters.

2.6.5 Comment: An industry representative (F-1, p. 10) pointed out at the public hearing that the calibration of ink and solvent meters every six months would impose a tremendous burden on the printer. Based on industry experience, he said that it takes a minimum of several weeks to have a meter recalibrated.

At the February 19, 1981 meeting (E-19), industry representatives made two important points about meter calibration. First, they pointed out that frequent calibration does not necessarily insure accuracy. They also explained that in-line methods of calibration require extra precautions and expense to avoid OSHA violations.

Response: The final regulation does not require that ink and solvent be measured by meters. Thus, the proposed meter recalibration requirements were deleted. However, as pointed out in the response to Comment 2.6.1, EPA consideres the ink metering system required in the proposed standard to be very reliable and useful.

As a result of this comment, more information was obtained from a meter manufacturer (E-8). The meter manufacturer felt that annual calibration was adequate and pointed out some alternatives to sending meters away from the plant for recalibration. EPA and the meter manufacturer (E-8) agree that this process could take several weeks. First, he stated that meter manufacturers typically provide recalibration service in the plant at a reasonable cost. Second, in-line methods of calibration using drain connections and graduated containers or master meters are relatively simple and could often be performed by plant personnel. Good design practice would provide for installation of testing connections for in-line calibration. Finally, meters could be removed from the service lines and calibrated in the plant maintenance shop on permanently set-up special test facilities or on portable test facilities provided by the meter company's service representative. Each calibration test run should take only a few minutes for either method used. The total calibration time including meter removal, testing and calibration, and reinstallation should take less than two hours. The Reports Impact Analysis (A-10), summarized in the preamble, conservatively assumed three man-hours per meter calibration.

EPA agrees that inks are a difficult metering service and that maintenance of accuracy may be a problem in some cases. Industry representatives pointed out that in-line calibration may violate OSHA requirements. EPA recognizes that precautions are necessary to prevent violations of OSHA regulations both during in-line calibration procedures and when meters are removed from the line for calibration.

2.6.6 Comment: One letter (D-1) stated that the standard calls for the metering of all cleaning solvents, but in many instances cleaning solvents are purchased in small quantities rather than large bulk quantities. The letter remarked that these small quantities should not have to be metered because accurate records of consumption can be kept by other means like counting the number of cans or drums used.

Response: As mentioned above, the proposed regulation has been changed to eliminate specific requirements for metering of ink and solvent used at the press. The owner or operator will be allowed to measure ink and solvent, including cleaning solvent, by some alternative procedure he selects.

EPA acknowledges that metering cleaning solvents purchased in small quantities is difficult and unnecessary. Recording the number and net weight or volume of drums or cans of cleaning solvent used would be acceptable. The amount of cleaning solvent used is very small compared to the total solvent used. The regulation requires cleaning solvent to be considered in the material balance, but the small amount used does not justify greater accuracy than obtainable by weighing or measuring volume.

2.6.7 Comment: Concerning metering requirements, the industry (D-1a; F-1, p. 10) agrees with the necessity for automatic temperature compensation of the recovered solvent volume meters. However, one representative pointed out that the base temperature setting on presently available automatic temperature compensated metering devices are preset to a fixed value by the manufacturer and have sealed mechanisms which cannot be readily adjusted to a new base temperature setting while in service. These commenters said that the regulation should include an alternative to the proposed required periodic base temperature setting adjustments. A calculated adjustment in metered quantities equivalent to the base temperature setting adjustment should be allowed.

Also, at the February 19, 1981 meeting (E-19), one industry representative presented a temperature compensation discussion paper from a meter manufacturer. The manufacturer stated that for commercial sale of liquids, the base temperature setting has been standardized at a reference temperature of 60°F and recommended that the setting not be changed.

Response: The final regulation requires measurement of recovered solvent, but does not specify a procedure that must be used. The regulation requires measurement of recovered solvent temperature only during a performance test and does not require an automatic temperature compensator (ATC). However, EPA feels that a volume meter with an ATC is the best method for monitoring recovered solvent. Information obtained by EPA on these devices did not reveal any significant problems in periodic field adjustment of the base temperatures setting. The Agency, however, considers that application of a calculated temperature correction factor to the fixed-base temperature compensated meter readings would be a suitable alternative to the proposed adjustment requirement.

EPA recognizes that 60° F is the standard base temperature setting for commercial sale of liquids. However, the recovered solvent meter is normally not used as a sales meter. A separate meter is used for loading tank trucks for sales shipment of recovered solvent. Therefore, the ATC base setting for the recovered solvent meter could be at any temperature within the adjustable range of the compensator.

2.6.8 Comment: One participant (F-1, p. 26-27) at the public hearing stated that the equation presented in the proposed regulation for calculation of the base temperature appears to be totally unmanageable, would be subject to many errors, and is unnecessary.

Response: The equation for calculation of base temperature has been deleted in the final regulation. The basis for calculation of the emission limit was changed from a volume balance to a mass balance. Therefore, the base temperature calculation is not required.

The solvent base temperature equation presented in the proposed regulation might look complicated, but actually, on a monthly basis, it would be fairly easy to apply. The ink and solvent temperatures will probably fluctuate with seasonal changes throughout a year's operation; however, the liquid temperatures are not expected to vary significantly during any given month. Thus, constant ink and solvent monthly temperatures

would probably result in a great simplification in the calculation. EPA acknowledges that this base temperature determination might still be subject to errors in computation. However, determination of compliance by any material balance procedure would be subject to human errors because of the many ink and solvent quantities needed to be monitored for rotogravure printing presses.

The proposed calculation of the monthly solvent base temperature was to determine if and when the recovered solvent meter ATC base setting needed to be adjusted. A correct base temperature setting is required to ensure that the solvent material balance derived from the direct volume meter readings sufficiently approximates a comparable actual mass balance. Expected normal temperature and density differences between measured volumes of recovered solvent and solvent used at the press could result in calculation of incorrect emission percentages. Without calculation of the solvent base temperature, the base temperature setting for the recovered solvent meter ATC would need to be high enough to prevent artificial determination of non-compliance by direct volume meter readings. However, a higher base temperature setting would allow too great a potential for artificially inflated apparent solvent recovery efficiencies. Therefore, to avoid potential errors of 2.0 to 3.5 percent or more in determination of compliance and to eliminate the calculation of solvent base temperature, the emission percentage in the final regulation is based on a mass balance. The mass balance procedure also accommodates those facilities where the raw ink usage is chosen to be measured by weight rather than by volume quantities (see Comment 2.6.1).

2.6.9 Comment: Two letters (D-1, D-2) addressed concerns about waterborne inks, stating that the waterborne ink requirements in the proposed standard are too restrictive. There were two provisions cited as being excessively restrictive. The first was the provision that prohibits the addition of VOC to waterborne inks at the press. The commenters felt that the regulation should permit VOC addition to purchased

raw waterborne inks and related coatings. Depending on press-side problems with ink composition or production conditions, they said that it is generally necessary to add small quantities of anti-foam agents, alcohol speed-drying agents and special cleaning agents.

One letter went on to discuss concerns about a second provision, saying that the formula used in the proposed regulation for calculating VOC content of waterborne inks is too restrictive with regard to the VOC content of the ink formulation. The proposed standard permits a bulk ink formulation where the ratio of volume VOC to volume solids no greater than 0.64. This is based on the assumption that typical solvent-borne inks currently consist of 20 percent solids, as applied. Therefore, an ink formulation with a low solids content would severely restrict the allowable VOC content of the ink. He noted that because of different printing parameters needed to print different products, solids content requirements and VOC content requirements may be grossly different for different printers. He said that typical hydrocarbon based ink formulations range from 12 to 35 percent solids as applied at the press. One printer may have an unfair competitive edge over another were these regulations finalized in this form.

The commenter then suggested that instead of a VOC to solids ratio, the waterborne ink requirement be modified to say that when using a waterborne ink system, not more than 16 percent VOC compared to total volatile compounds shall be emitted, calculated on an annual basis. The percent VOC emitted may be calculated by the following equation:

$$V_1 = \frac{V_2 + V_3}{V_2+V_3+V_4+V_5} \times 100$$

where V_1 is the volume percent of VOC actually emitted,
V_2 is the volume of VOC in the bulk ink,
V_3 is the volume of VOC added at the press-side,
V_4 is the volume of water in the bulk ink, and
V_5 is the volume of water added at the press-side.

Response: It was not the intent of the regulation to restrict the use of waterborne coatings. EPA's early information did not indicate the need for additions of VOC to waterborne inks at the press. Latecoming data have shown this necessity.

EPA agrees with the suggested format, but the calculation should be on a mass not volume basis. The final regulation requires that the VOC weight content be no more than 16 percent of the total volatile portion of mixed waterborne inks, as applied. Use of this approach requires measurement of water and VOC added at the press. This follows the approach suggested in this comment with the exception of using a volume basis.

The VOC to solids ratio was dropped from the final regulation because the solids content of waterborne inks can vary substantially. This point was confirmed in a telephone conversation with an ink manufacturer (E-18) and at the February 19, 1981 meeting with industry (E-19).

The comment suggested calculating the percent VOC emitted on an annual basis. The preamble to the proposed regulation (45 FR 71548) explains that the Administrator believes a one-month or four-week performance averaging period is best to ensure that excess emissions do not go undetected and that new sources are controlled to the best level achievable. A four-week or one-month period was chosen as sufficiently long to accomodate operational fluctuations which could affect the level of emission control.

2.6.10 Comment: One commenter's letter (D-4) discussed the combined use of water-based inks and solvent adsorption/recovery. This commenter was called and asked for a clarification of his statements (E-13). He pointed out that the proposed rules do not address the approach of using a combination of water-based inks and solvent-borne inks on different units at the same press. He said that specific provisions for this case should be included in the regulation. Dryer exhaust from water-based units should be vented to the atmosphere instead of to the carbon adsorption system because the water vapor would affect the carbon's activity and

because the water miscible organics would be lost through the decanter. This commenter suggested that if the VOC content of the water-based coating is less than 16 volume percent, then the difference should be applied as a credit to allow lower control of the VOC in the solvent based ink units on the press. In other words, the VOC content of the waterborne inks should be included in the emission percentage equation presented in Section 60.433(c)(4) of the proposed regulation.

Response: Prior to this comment, EPA was unaware that the combined use of waterborne and solvent-borne inks on the same press would be practical or even desirable. It should be noted that the commenter is not a publication printer, but is a paper supplier to the publication printing industry. The affected industry had not mentioned any such combined use for waterborne inks until the February 19, 1981 meeting (E-19). At this meeting, one publication printer said his company had been using a waterborne yellow for about one year.

EPA has included compliance provisions in the final regulation to allow the combined use of waterborne and solvent-borne inks. EPA agrees that the compliance provisions should allow for lower capture and control of solvent-borne ink VOC when the waterborne ink VOC, as applied, contains less than 16 weight percent VOC in the volatile portion. The intent is to provide an incentive for development of very low VOC waterborne inks. Also, the provisions allow use of higher VOC waterborne inks, provided that the capture and control of solvent-borne VOC would be correspondingly increased to comply with the 16 percent emission limit for the entire press. EPA agrees that dryer exhaust and fugitive emissions from waterborne units should not be vented through carbon adsorbers and may be vented to the atmosphere provided that the entire press complies with the 16 percent emission limit.

Compliance is determined using a mass material balance. To be in compliance, the average VOC emission percentage must be no more than 16 percent of the total mass of VOC solvent and water used. The material balance is calculated as: total mass of VOC used minus total mass of

VOC recovered divided by total mass of VOC used plus total mass of water used. The water used includes dilution water and water in waterborne inks.

2.7 TEST METHODS

2.7.1 Comment: One industry representative (D-1a) wrote that the preamble to the proposed regulation (45 FR 71550) states, "the VOC content data supplied by the ink manufacturer for the purchased raw inks and related coatings should be based on the best method available to the manufacturer." He stated that the gravure industry recognizes Reference Method 29 to be a valid test method, but feels that the owner or operator of the affected facility should also have the opportunity to use the best equivalent method available that is accepted by the Administrator to determine VOC content.

In a telephone call (E-12) made to clarify the commenter's intent, he said that printers should have the option of using alternative analytical methods such as gas chromatography (GC) and mass spectrometry (MS).

Response: EPA has renumbered the Reference Methods since this regulation was proposed. What was Reference Method 29 is now Reference Method 24A. The method itself has not been changed.

The proposed and final versions of the regulation recognize two ways to determine VOC content in raw ink. One method is to record the amount of each component part when an ink is manufactured. Obviously, only the manufacturer can supply this data. The other method is by a chemical analysis of the ink. The regulation allows the use of data from the manufacturer to relieve the industry of this chore. After the ink has been made up by the manufacturer, the only possible way to determine its content is by sampling and analysis. The proposed and final versions of the regulation specify Reference Method 24A (formerly 29) as the only acceptable analytical method.

At the present time, EPA has no reference method or specific procedures for GC or MS total VOC content analysis of printing inks.

One industry representative (E-19) noted that GC results were consistent with the ink manufacturer's data, but noted procedural problems. The results of GC analysis of raw ink conducted at Texas Color Printers, Inc. during the development of the proposed standard, did not agree with the ink manufacturer's data. EPA has no further test data on GC or MS analysis of total VOC content of printing inks. GC and MS methods are more expensive and much more complicated than Reference Method 24A, yet Method 24A is more reliable for determination of the total VOC content.

One problem with analysis of naptha-based solvents is that the amount of naptha present in the sample is hard to calculate because it is made up of several components. These components do not give sharp peaks on the GC so that total area of the naptha curve is hard to measure.

For these reasons, the final regulation includes Reference Method 24A as the only acceptable analytical method for determining VOC content in raw inks. However, the General Provisions for Standards of Performance for New Stationary Sources (40 CFR 60.8 (b)) allow owners or operators of affected facilities to petition the Administrator for permission to use an alternative procedure for determining VOC content.

2.8 REPORTING AND RECORDKEEPING

2.8.1 Comment: In comments made both at the public hearing and in letters (D-1; D-4; F-1, p. 9) it was stressed that the gravure industry thinks ten days is too short a time limit for reporting when an affected facility is out of compliance. One public hearing participant pointed out that ten days does not allow enough time to determine whether an apparent violation might be due to meter errors and a great number of meters may have to be checked. He said that a plant may receive more than 100 shipments of ink and extender per month and information on the solvent content of each shipment has to be obtained. There are additional complications involved with multi-plant operations in remote locations. According to these comments, a twenty- or thirty-day reporting period should be allowed.

Response: In the final regulation, EPA has deleted all periodic reporting requirements. Notification and performance test reports required under the General Provisions (40 CFR 60.7 and 60.8) are still required. Deleting periodic reporting requirements saves resources of both the EPA and industry. Plants will be required to maintain monthly records of estimated emission percentages for two years showing proper operation and maintenance of control equipment. The required recordkeeping serves as a useful troubleshooting tool for the company and allows enforcement personnel to check for proper operation and maintenance if necessary. Data on the total amount of solvent and water used at the press and the amount of solvent recovered will need to be gathered and recorded each month along with the estimation of the emission percentage. EPA has the authority to inspect these records at any time and to require additional performance tests.

2.8.2 Comment: One industry spokesman (D-1) stated that the standards of performance would impose unnecessary burdens of recordkeeping and compliance monitoring on both the States and the gravure industry.

Response: As mentioned in responses to other comments, several changes have been made in the final regulation that will reduce record-keeping. Continual monthly performance tests requirements have been deleted. Meters are no longer required for ink and solvent measurement and temperature monitoring is required only during a performance test. The only two required reports are a notification when a facility becomes subject to the regulation and a report of the results of a performance test. However, plants are required to keep monthly records described in the response to comment 2.8.1 that show proper operation and maintenance of control equipment.

2.8.3 Comment: The same commenter (D-1; F-1, p. 10) referred to the estimate in the preamble of one-third of a person's time per company for recordkeeping and reporting. He said that the estimate was unrealistic

because there are a large number of meters and delivery records to be checked.

Response: The estimate of one-third person-year for recordkeeping and reporting was based on itemized calculations presented in the Reports Impact Analysis (II-A-10). The calculation estimating the maintenance of meter reading and ink VOC content data was based on 80 man-hours per combined facility (i.e. two associated presses and four associated presses).

As mentioned in responses to other comments, recordkeeping requirements have been reduced and reporting is required only for notifications and performance tests. The Reports Impact Analysis has been revised to reflect these changes. The revised estimate for recordkeeping and reporting by the entire industry is about 22,000 person-hours required over the first five years of applicability of the standard. The Administrator believes this is a reasonable manpower requirement.

2.8.4 Comment: One letter (D-4) addressed the labor requirements for reporting. The author was telephoned (E-13) for clarification of his comment. He pointed out that the preamble to the proposed standards mentions that five additional persons throughout the industry would be required for reporting. He felt this was misleading and that no additional people would be hired, but that some portion of existing employees' time would have to be shifted to monitoring. He stated that actual industry-wide labor requirements are likely to be higher when the projected 75 new presses could be distributed at as many as 37 locations. He said this was true because the time efficiency of monitoring one press is much lower than that for monitoring several presses at one location.

Response: The preamble was confusing on this point. The intent was to convey that reporting requirements would generate a total of five additional person-years of work annually for all anticipated new facilities. The five person-years are a measure of the total labor requirement, not

the number of people required. This estimate was based on itemized calculations of the time necessary to complete each required report at the estimated 75 new publication rotogravure presses that will have to comply with this standard over the next five years. Those calculations showed that in the five-year period, 43,180 person-hours or 22.3 person-years would be required. This is equivalent to 4.5 person-years annually.

As mentioned above, however, reporting requirements have been reduced in the final regulation. The Reports Impact Analysis has been revised to reflect the requirements of the final regulation.

2.9 MISCELLANEOUS

2.9.1 Comment: It was pointed out (D-1; F-1, p. 8, 9, 17, 18) at the public hearing and in a letter that the regulation clearly exempts proof presses. However, in the preamble (45 FR 71538) to the proposed regulation, there is a reference to smaller four-unit proof presses. Commenters noted that proof presses may have a different number of units than four and that this term should be eliminated to avoid confusion by other agencies. The commenter asked that the preamble be revised to omit the concept of four-unit proof presses.

Response: The regulation exempts proof presses regardless of the number of units. The term "proof press" was added to the list of definitions in the final regulation. The statement to which this comment refers appears in the preamble and states, "The smaller four-unit proof presses ... would not be affected by the proposed standard." This statement was not meant to be a definition. The proposed regulation does not use "four-unit" in regard to proof presses, but defines an affected facility as one that prints saleable products. The concept of saleable products exempts proof presses. The preamble to the promulgated regulation does not use the term "four-unit" to describe proof presses.

2.9.2 Comment: Two participants (F-1, p. 19-21) at the public hearing discussed the fact that page 71547 of the preamble to the proposed

regulation states, "A VOC vapor monitor could be installed in the dryer exhausts streams to control the amount of internal air recirculation; this would maximize the VOC vapor concentration in the SLA stream treated by the solvent control device." They pointed out that this is a misunderstanding. Controlling the dryer exhaust air flow, not the recirculation flow, is required in order to control the dryer exhaust solvent concentration.

Response: EPA agrees with this comment and concurs that the preamble is confusing on this point. Regulating the dryer exhaust air flow with on-line vapor monitors to control the VOC concentration is thoroughly discussed in the BID, Vol. 1, p. 3-16, 6-10.

2.9.3 Comment: The director of the Bureau of Air Management for the State of Wisconsin Department of Natural Resources (D-6) noted that a monthly averaging period would be used to determine compliance with the NSPS. However, guidance from EPA's recommended reasonably available control technology emission limitations (RACT), which Wisconsin is now in the process of adopting, calls for instantaneous or daily average compliance. The Director feels that it is inappropriate for U. S. EPA to instruct Wisconsin to adopt more stringent compliance requirements for existing sources than it proposes to impose on new facilities. He requests that EPA modify the current RACT guidance. The Director stressed that although this issue deals with RACT guidance, it is clearly intertwined with the NSPS and cannot be separated.

Response: EPA is studying whether revision of the RACT recommendations is appropriate.

2.9.4 Comment: The National Institute for Occupational Safety and Health (NIOSH) noted (H-2) that worker exposure to toluene and xylene, the principal components used in rotogravure printing solvents, is an obvious health hazard that should be addressed in an EIS. Detailed discussions of the economic, environmental, and energy impacts associated

with the three alternative levels of control were presented in the preamble, but there was no evaluation of any health aspect. NIOSH has developed criteria documents which evaluate effects of exposure to toluene and xylene on health.

Response: EPA agrees that there is a health hazard involved with the exposure to toluene and xylene. This standard would not increase worker exposure to these substances. Generally speaking, the Clean Air Act gives EPA the authority to regulate pollutants affecting ambient air quality. Ambient air is considered to be air outside the plant. Worker exposure to hazardous substances inside the plant is controlled under the Occupational Safety and Health Act and standards for worker exposure to toluene and xylene have been promulgated under this Act.

The two documents mentioned in this comment provide useful information on exposure to toluene and xylene. Toluene exposure is discussed in Occupational Exposure to Toluene: Criteria for a Recommended Standard, prepared by the U.S. National Institute for Occupational Safety and Health, NIOSH/HSM-73-11023, Washington, D. C., 1973 (98 pp.). Exposure to xylene is discussed in Occupational Exposure to Xylene: Criteria for a Recommended Standard, proposed by the same institute, NIOSH/75-168, Washington, D.C., 1975 (101 pp.).

United States
Environmental Protection
Agency

Office of Air, Noise, and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park NC 27711

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